

WHAT IS CLAIMED IS:

1. A method for transmitting an optical signal, comprising:  
receiving an optical signal at a pulse modulator;  
receiving a composite signal comprising a main signal and a harmonic signal  
5 at the pulse modulator, the main signal having a main frequency, the harmonic signal  
having a harmonic frequency, the harmonic frequency being a harmonic of the main  
frequency;  
modulating the optical signal in accordance with the composite signal to  
generate a plurality of pulses in the optical signal, each pulse of the plurality of pulses  
10 having a duration within the range of twenty to one hundred picoseconds;  
receiving the optical signal at a signal modulator;  
receiving information at the signal modulator;  
coding the information in the plurality of pulses of the optical signal; and  
sending the optical signal to an optical fiber comprising a step-index fiber.  
15
2. The method of Claim 1, further comprising generating the composite  
signal from the main signal and the harmonic signal by:  
receiving the main signal at a first conductive strip of a combining filter, the  
main signal having a main wavelength, the first conductive strip having a portion  
20 proportional to the main wavelength;  
receiving the harmonic signal at a second conductive strip of the combining  
filter; and  
generating the composite signal from the main signal and the harmonic signal  
using the first conductive strip and the second conductive strip.  
25

3. The method of Claim 1, further comprising generating the composite signal from the main signal and the harmonic signal by:

receiving the main signal at a first input coupled to a first conductive strip of a combining filter, the main signal having a main wavelength, the first conductive strip  
5 having a first portion proportional to the main wavelength;

receiving the harmonic signal at a second input coupled to a second conductive strip of the combining filter, the second conductive strip having a second portion proportional to the main wavelength;

isolating the first input from the second input using a third conductive strip;

10 and

generating the composite signal from the main signal and the harmonic signal using the first conductive strip and the second conductive strip.

4. The method of Claim 1, further comprising:

15

amplifying the main signal;

amplifying the harmonic signal;

generating the composite signal from the main signal and the harmonic signal;

and

20 sending the composite signal directly to the pulse modulator without further amplification.

5. The method of Claim 1, further comprising adjusting the duration of each pulse of the plurality of pulses by changing a bias of the pulse modulator.

25

6. The method of Claim 1, further comprising adjusting the duration of each pulse of the plurality of pulses by changing an amplitude of at least one of the main signal and the harmonic signal.

30 7. The method of Claim 1, further comprising adjusting the duration of each pulse of the plurality of pulses by changing a relative phase between the main signal and the harmonic signal.

8. The method of Claim 1, further comprising compensating for dispersion of the optical signal by:

receiving the optical signal at a compensation unit comprising a dispersion-compensating fiber; and

5 applying a negative dispersion to the optical signal.

9. The method of Claim 1, further comprising compensating for dispersion of the optical signal by:

receiving the optical signal at a compensation unit comprising a grating having  
10 a non-constant grating spacing; and

applying a negative dispersion to the optical signal.

10. A system for transmitting an optical signal, comprising:  
a pulse modulator operable to:  
receive an optical signal;  
receive a composite signal comprising a main signal and a harmonic  
5 signal, the main signal having a main frequency, the harmonic signal having a  
harmonic frequency, the harmonic frequency being a harmonic of the main frequency;  
and  
modulate the optical signal in accordance with the composite signal to  
generate a plurality of pulses in the optical signal, each pulse of the plurality of pulses  
10 having a duration within the range of twenty to one hundred picoseconds; and  
a signal modulator coupled to the pulse modulator and operable to:  
receive the optical signal;  
receive information;  
code the information in the plurality of pulses of the optical signal; and  
15 send the optical signal to an optical fiber comprising a step-index fiber.
11. The system of Claim 10, further comprising a combining filter coupled  
to the pulse modulator and operable to generate the composite signal from the main  
signal and the harmonic signal by:  
20 receiving the main signal at a first conductive strip of the combining filter, the  
main signal having a main wavelength, the first conductive strip having a portion  
proportional to the main wavelength;  
receiving the harmonic signal at a second conductive strip of the combining  
filter; and  
25 generating the composite signal from the main signal and the harmonic signal  
using the first conductive strip and the second conductive strip.

12. The system of Claim 10, further comprising a combining filter coupled to the pulse modulator and operable to generate the composite signal from the main signal and the harmonic signal by:

receiving the main signal at a first input coupled to a first conductive strip of  
5 the combining filter, the main signal having a main wavelength, the first conductive strip having a first portion proportional to the main wavelength;

receiving the harmonic signal at a second input coupled to a second conductive strip of the combining filter, the second conductive strip having a second portion proportional to the main wavelength;

10 isolating the first input from the second input using a third conductive strip; and

generating the composite signal from the main signal and the harmonic signal using the first conductive strip and the second conductive strip.

15 13. The system of Claim 10, further comprising:

a first narrow band amplifier operable to amplify the main signal;

a second narrow band amplifier operable to amplify the harmonic signal; and

a combining filter coupled to the first narrow band amplifier, the second narrow band amplifier, and the pulse modulator, the combining filter operable to:

20 generate the composite signal from the main signal and the harmonic signal; and

send the composite signal directly to the pulse modulator without further amplification.

25 14. The system of Claim 10, wherein the pulse modulator is further operable to change a bias to adjust the duration of each pulse of the plurality of pulses.

30 15. The system of Claim 10, further comprising a narrow band amplifier coupled to the pulse modulator and operable to change an amplitude of at least one of the main signal and the harmonic signal to adjust the duration of each pulse of the plurality of pulses.

16. The system of Claim 10, further comprising a phase adjuster coupled to the pulse modulator and operable to change a relative phase between the main signal and the harmonic signal to adjust the duration of each pulse of the plurality of pulses.

17. The system of Claim 10, further comprising a compensation unit comprising a dispersion-compensating fiber and operable to compensate for dispersion of the optical signal by applying a negative dispersion to the optical signal.

10

18. The system of Claim 10, further comprising a compensation unit comprising a grating having a non-constant grating spacing and operable to compensate for dispersion of the optical signal by applying a negative dispersion to the optical signal.

15

19. A system for transmitting an optical signal, comprising:
- means for receiving an optical signal at a pulse modulator;
  - means for receiving a composite signal comprising a main signal and a harmonic signal at the pulse modulator, the main signal having a main frequency, the harmonic signal having a harmonic frequency, the harmonic frequency being a harmonic of the main frequency;
  - means for modulating the optical signal in accordance with the composite signal to generate a plurality of pulses in the optical signal, each pulse of the plurality of pulses having a duration within the range of twenty to one hundred picoseconds;
  - means for receiving the optical signal at a signal modulator;
  - means for receiving information at the signal modulator;
  - means for coding the information in the plurality of pulses of the optical signal; and
  - means for sending the optical signal to an optical fiber comprising a step-index fiber.

20. A method for transmitting an optical signal, comprising:
- amplifying a main signal and a harmonic signal, the main signal having a main frequency, the harmonic signal having a harmonic frequency, the harmonic frequency being a harmonic of the main frequency;
- 5 generating a composite signal from the main signal and the harmonic signal by:
- receiving the main signal at a first input coupled to a first conductive strip of a combining filter, the main signal having a main wavelength, the first conductive strip having a first portion proportional to the main wavelength;
- 10 receiving the harmonic signal at a second input coupled to a second conductive strip of the combining filter, the second conductive strip having a second portion proportional to the main wavelength;
- isolating the first input from the second input using a third conductive strip; and
- 15 generating the composite signal from the main signal and the harmonic signal using the first conductive strip and the second conductive strip;
- sending the composite signal directly to the pulse modulator without further amplification;
- receiving an optical signal at a pulse modulator;
- 20 receiving the composite signal comprising the main signal and the harmonic signal at the pulse modulator;
- modulating the optical signal in accordance with the composite signal to generate a plurality of pulses in the optical signal, each pulse of the plurality of pulses having a duration within the range of twenty to one hundred picoseconds;
- 25 receiving the optical signal at a signal modulator;
- receiving information at the signal modulator;
- coding the information in the plurality of pulses of the optical signal;
- sending the optical signal to an optical fiber comprising a step-index fiber;
- adjusting the duration of each pulse of the plurality of pulses by changing a
- 30 bias of the pulse modulator;
- adjusting the duration of each pulse of the plurality of pulses by changing an amplitude of at least one of the main signal and the harmonic signal;



adjusting the duration of each pulse of the plurality of pulses by changing a relative phase between the main signal and the harmonic signal;

compensating for dispersion of the optical signal by:

- 5     receiving the optical signal at a compensation unit comprising at least one of a dispersion-compensating fiber and a non-constant grating spacing; and  
          applying a negative dispersion to the optical signal.